

Claims:

1. A system to join an actuator element to a slider element comprising:  
a slider element adapted to be coupled to an actuator element having a generally 'U'-  
shaped structure, the 'U'-shaped structure being formed by at least a first arm joined at one end  
to an actuator base and a second arm joined at one end to said actuator base, said first arm having  
a first raised portion of a first contour and said second arm having a second raised portion of a  
second contour generally opposing in direction and generally parallel to said first surface;  
said slider element having a first surface with a first recessed portion contoured to accept,  
for non-rotatable coupling, said first raised portion and a second surface with a second recessed  
portion contoured to accept, for non-rotatable coupling, said second raised portion; wherein  
said first raised portion is to bond within said first recessed portion by a bonding agent;  
and  
said second raised portion is to bond within said second recessed portion by said bonding  
agent.

2. The system of claim 1, wherein the actuator element is a micro-actuator and the slider  
element is a side step slider.

3. The system of claim 2, wherein the micro-actuator is a piezoelectric micro-actuator.

4. The system of claim 3, wherein the bonding agent is epoxy.

1 5. The system of claim 4, wherein the contours of said first raised portion with said first  
2 recessed portion and the contours of said second raised portion with said second recessed portion  
3 prevent rotational movement of the slider during a curing process of said epoxy.

1 6. A system to join an actuator element to a slider element comprising:  
2 a slider element adapted to be coupled to an actuator element having a generally 'U'-  
3 shaped structure, the 'U'-shaped structure being formed by at least a first arm joined at one end  
4 to an actuator base and a second arm joined at one end to said actuator base and generally  
5 parallel to said first arm;  
6 said slider element having a first recessed planar surface forming a first step and a second  
7 recessed planar surface forming a second step generally parallel and generally opposite in  
8 direction from the first step to accept for non-rotatable coupling said actuator, the first step  
9 accepting the first arm and the second step accepting the second arm; wherein  
10 said first arm is to bond within said first step by a bonding agent; and  
11 said second arm is to bond within said second step by said bonding agent.

1 7. The system of claim 6, wherein the actuator element is a micro-actuator and the slider  
2 element is a side step slider.

1 8. The system of claim 7, wherein the micro-actuator is a piezoelectric micro-actuator.

1 9. The system of claim 8, wherein the bonding agent is epoxy.

1 10. The system of claim 9, wherein the first step accepts the first arm and the second step  
2 accepts the second arm to prevent rotational movement of the slider during a curing process of  
3 said epoxy.

1 11. The system of claim 10, wherein said slider has a third recessed planar surface forming a  
2 third step that is generally perpendicular to the first and second steps.

1 12. The system of claim 11, wherein said slider has said third recessed planar surface  
2 forming said third step to reduce slider weight.

1 13. A system to join an actuator element to a slider element comprising:  
2 a slider element adapted to be coupled to an actuator element having a generally 'U'-  
3 shaped structure, the 'U'-shaped structure being formed by at least a first arm joined at one end  
4 to an actuator base and a second arm joined at one end to said actuator base, said first arm having  
5 a first bonding surface and said second arm having a second bonding surface that is generally  
6 opposing in direction and generally parallel to said first surface;

7 said slider element having a first bonding surface with a first recessed portion contoured  
8 to partially butt said first arm bonding surface and to provide a partial cleft with said first arm  
9 bonding surface; wherein

10 said first slider bonding surface is to bond with said first arm bonding surface; and

11 said second slider bonding surface is to bond with said second arm bonding surface.

1 14. The system of claim 13, wherein the actuator element is a micro-actuator and the slider  
2 element is a side step slider.

1 15. The system of claim 14, wherein the micro-actuator is a piezoelectric micro-actuator.

1 16. The system of claim 15, wherein the bonding agent is epoxy.

1 17. The system of claim 16, wherein said first slider bonding surface partially butts said first  
2 arm bonding surface, providing said partial cleft, and said second slider bonding surface partially  
3 butts said second arm bonding surface, providing said partial cleft, to prevent epoxy overflow.

1 18. A method to join an actuator element to a slider element comprising:  
2 adapting a slider element to be coupled to an actuator element having a generally 'U'-  
3 shaped structure, the 'U'-shaped structure being formed by at least a first arm joined at one end  
4 to an actuator base and a second arm joined at one end to said actuator base, said first arm having  
5 a first raised portion of a first contour and said second arm having a second raised portion of a  
6 second design generally opposing in direction and generally parallel to said first surface;

7 adapting said slider element to have a first surface with a first recessed portion contoured  
8 to accept, for non-rotatable coupling, said first raised portion and a second surface with a second  
9 recessed portion contoured to accept for non-rotate-able coupling said second raised portion;

10 bonding within said first recessed portion said first raised portion by a bonding agent; and

11 bonding within said second recessed portion said second raised portion by said bonding  
12 agent.

1 19. The method of claim 18, wherein the actuator element is a micro-actuator and the slider  
2 element is a side step slider.

1 20. The method of claim 19, wherein the micro-actuator is a piezoelectric micro-actuator.

1 21. The method of claim 20, wherein the bonding agent is epoxy.

1 22. The method of claim 21, wherein the contours of said first raised portion with said first  
2 recessed portion and the contours of said second raised portion with said second recessed portion  
3 prevent rotational movement of the slider during a curing process of said epoxy.

1 23. The method of claim 18, wherein said slider is generally box-shaped and is formed with  
2 said first and second recessed portions by:

3 cutting a rectangular-surfaced large bar of a slider material in a direction perpendicular to  
4 the length of said large bar to form a rectangular-surfaced small bar, the length for which is  
5 perpendicular to said length of said large bar;

6 cutting a prescribed depth lengthwise along a first surface of the small bar to form said  
7 first recessed portion and cutting said prescribed depth lengthwise along a second surface of the  
8 small bar to form said second recessed portion, said second surface being generally parallel to  
9 said first surface; and

10 cutting the small bar perpendicular to the length of the small bar.

1 24. A method to join an actuator element to a slider element comprising:

2        adapting a slider element to be coupled to an actuator element having a generally 'U'-  
3        shaped structure, the 'U'-shaped structure being formed by at least a first arm joined at one end  
4        to an actuator base and a second arm joined at one end to said actuator base and generally  
5        parallel to said first arm;  
6        adapting said slider element to have a first recessed planar surface to form a first step and  
7        a second recessed planar surface to form a second step generally parallel and generally opposite  
8        in direction from the first step to accept, for non-rotatable coupling, said actuator, the first step to  
9        accept the first arm and the second step to accept the second arm;  
10       bonding within said first step said first arm by a bonding agent; and  
11       bonding within said second step said second arm by said bonding agent.

1    25.    The method of claim 24, wherein the actuator element is a micro-actuator and the slider  
2    element is a side step slider.

1    26.    The method of claim 25, wherein the micro-actuator is a piezoelectric micro-actuator.

1    27.    The method of claim 26, wherein the bonding agent is epoxy.

1    28.    The method of claim 27, wherein the first step accepts the first arm and the second step  
2    accepts the second arm to prevent rotational movement of the slider during a curing process of  
3    said epoxy.

1 29. The method of claim 28, wherein said slider has a third recessed planar surface forming a  
2 third step that is generally perpendicular to the first and second steps.

1 30. The method of claim 29, wherein said slider has said third recessed planar surface  
2 forming said third step to reduce slider weight.

1 31. The method of claim 24, wherein said slider is generally box-shaped and is formed with  
2 said first and second steps by:

3 cutting a groove to a prescribed depth with a tool of a first cutting width a rectangular-  
4 surfaced bar of a slider material in a direction perpendicular to the length of said bar at a  
5 location; and

6 cutting through said bar in a direction perpendicular to the length at said location with a  
7 tool of a cutting width less than said first cutting width.

1 32. The method of claim 30, wherein said slider is generally box-shaped and is formed with  
2 said first, second, and third steps by:

3 cutting to a depth with a tool of a first cutting width a rectangular-surfaced bar of a slider  
4 material in a direction parallel to the length of said bar;

5 cutting a groove to a depth with a tool of a second cutting width said bar in a direction  
6 perpendicular to the length of said bar at a location; and

7 cutting through said bar in said direction perpendicular to the length at said location with  
8 a tool of a cutting width less than said second cutting width.

1 33. A method to join an actuator element to a slider element comprising:  
2 a slider element adapted to be coupled to an actuator element having a generally 'U'-  
3 shaped structure, the 'U'-shaped structure being formed by at least a first arm joined at one end  
4 to an actuator base and a second arm joined at one end to said actuator base, said first arm having  
5 a first bonding surface and said second arm having a second bonding surface that is generally  
6 opposing in direction and generally parallel to said first surface;  
7 said slider element having a first bonding surface with a first recessed portion contoured  
8 to partially butt said first arm bonding surface and to provide a partial cleft with said first arm  
9 bonding surface; wherein  
10 said first slider bonding surface is to bond with said first arm bonding surface; and  
11 said second slider bonding surface is to bond with said second arm bonding surface.

1 34. The method of claim 33, wherein the actuator element is a micro-actuator and the slider  
2 element is a side step slider.

1 35. The method of claim 34, wherein the micro-actuator is a piezoelectric micro-actuator.

1 36. The method of claim 35, wherein the bonding agent is epoxy.

1 37. The method of claim 36, wherein said first slider bonding surface partially butts said first  
2 arm bonding surface, providing said partial cleft, and said second slider bonding surface partially  
3 butts said second arm bonding surface, providing said partial cleft, to prevent epoxy overflow.



1 38. The method of claim 32, wherein said slider is generally box-shaped and is formed by:  
2 cutting a slot in a bar of a prescribed length perpendicular to the length of said bar at a  
3 location and to a prescribed depth with a tool of a first cutting width, said bar being rectangular-  
4 surfaced; and  
5 cutting through said bar in said direction perpendicular to the length at said location with  
6 a tool of a cutting width less than said first cutting width.